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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte PIERRE TOMASINI,
NYLES CODY and
CHANTAL ARENA

Appeal 2008-1154
Application 10/799,335
Technology Center 1700

Decided: March 28, 2008

Before CHUNG K. PAK, CATHERINE Q. TIMM, and
JEFFREY T. SMITH, *Administrative Patent Judges*.

PAK, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § 134 from the Examiner's final rejection of claims 1 through 19 and 21 through 53, all of the claims pending in the above-identified application. We have jurisdiction pursuant to 35 U.S.C. § 6.

STATEMENT OF THE CASE

The subject matter on appeal is directed to a method for forming "[a] blanket SiGe layer having a reduced defect density" (Spec. 3, para. 0011). According to the Specification (*id.*):

> The blanket (non-selective) deposition can occur over a bare wafer or over a patterned substrate, for example having windows which could otherwise be used in a selective deposition process. Crystalline defects are preferentially removed by the etchant gas during the blanket SiGe deposition, thereby resulting in a smoother SiGe surface having fewer defects as compared to a SiGe material deposited without the etchant in the precursor gas mixture.

The blanket deposition, unlike selective deposition, requires the entire or almost entire coverage of a substrate, including any surface pattern thereon (Spec. 2, para. 0004; 4, para. 0013, and the Figure). Further details of the appealed subject matter are recited in representative claims 1, 19, 39, and 44 reproduced below:

1. A method for blanket depositing a SiGe film comprising:

intermixing a silicon source, a germanium source and an etchant to form a gaseous precursor mixture;

flowing the gaseous precursor mixture over a substrate under chemical vapor deposition conditions; and

depositing a blanket layer of epitaxial SiGe over the substrate, the epitaxial SiGe formed from at least some of the components of the gaseous precursor mixture.

19. A method comprising:

providing a single crystal silicon substrate in a chemical vapor deposition chamber;

supplying a mass of silicon precursor into the chamber;

supplying a mass of germanium precursor into the chamber;

supplying a mass of etchant into the chamber, wherein the mass of etchant supplied is less than the mass of silicon precursor and the mass of germanium precursor, combined; and

depositing a blanket SiGe film over the substrate.

39. A method of blanket depositing a SiGe film comprising:

intermixing a silicon source gas and a germanium source gas;

adding an etchant to the intermixed source gases to from a gaseous precursor mixture;

flowing the gaseous precursor mixture over a substrate under chemical vapor deposition conditions; and

depositing a blanket layer of epitaxial SiGe onto the substrate;

wherein the mass of etchant added to the intermixed source gases is less than a mass of etchant added to the intermixed source gases in a selective deposition process.

44. A method of blanket depositing a film comprising:

providing a single crystal substrate in a chemical vapor deposition chamber;

supplying a mass of germanium source gas into the chamber;

supplying a mass of etchant into the chamber, wherein the mass of etchant supplied is less than the mass of germanium source gas; and

blanket depositing a film over the single crystal substrate, wherein the film comprises germanium.

The Examiner has relied upon the following references as evidence of unpatentability of the claimed subject matter:

Murthy US 2003/0157787 A1 Aug. 21, 2003

Mayer et al. (Mayer), Electronic Materials Science: For Integrated Circuits in Si and GaAs, Macmillan Publishing Company, p.40 (1990).

The Applicants' admission at page 6, para. 0019, of the Specification (hereinafter referred to as "the admitted prior art").

The Examiner has rejected the claims on appeal as follows:

1) Claims 1 through 4, 6, 9 through 15, 19, 21 through 28, 31, 32, 34, 39 through 45, and 51 through 53 under 35 U.S.C. § 102(e) as anticipated by the disclosure of Murthy;

2) Claim 5 under 35 U.S.C. § 103(a) as unpatentable over the combined disclosures of Murthy and Mayer; and

3) Claims 7, 8, 16 through 18, 29, 30, 33, 35 through 38, and 46 through 50 under 35 U.S.C. § 103(a) as unpatentable over the combined disclosures of Murthy and the admitted prior art.

The Appellants appeal from the Examiner's decision rejecting the claims on appeal under 35 U.S.C. §§ 102(a) and 103.

RELEVANT FACTUAL FINDINGS, PRINCIPLES OF LAW, ISSUES AND ANALYSES

I. *ANTICIPATION*

Under 35 U.S.C. § 102(b), anticipation is established only when a single prior art reference describes, either expressly or under the principle of inherency, each and every element of a claimed invention. *In re Spada*, 911 F.2d 705, 708 (Fed. Cir. 1990).

The Appellants do not dispute that Murthy teaches employing a gaseous precursor mixture of a silicon source, a germanium source and an etchant under chemical vapor deposition conditions (Br. 5-8). Rather, the Appellants contend that Murthy does not teach employing a gaseous precursor mixture of a silicon source, a germanium source and an etchant in the blanket deposition of a SiGe film over a substrate (*id*).

The dispositive question is, therefore, whether the Examiner has demonstrated that Murthy teaches the blanket deposition of a silicon germanium film over a substrate using the above particular gaseous precursor mixture within the meaning of 35 U.S.C. § 102(e). On this record, we answer this question in the negative.

As correctly pointed out by the Appellants (Br. 5-6), Murthy teaches employing a gaseous precursor mixture of a silicon source, a germanium source and an etchant only for the purpose of carrying out selective deposition of a silicon germanium film. (*See* Figs. 3 and 5, together with paras. 0027 to 0040). This particular gaseous mixture is said to be useful for selective deposition because the etchant, when used together with a dielectric material, prevents a crystal film growth in the selective area

covered by the dielectric material (paras. 0027, 0035, 0040, and 0041). As to the "blanket deposition," Murthy limits it to the application of SiO_2, Si_3N_4, a gate electrode material, and a gaseous precursor mixture of a silicon source and a germanium source on a substrate (Figs. 1 and 2, and paras. 0024 to 0026 and 0055.) Thus, we concur with the Appellants that the Examiner has not demonstrated that Murthy anticipates the subject matter defined by claims1 through 4, 6, 9 through 15, 19, 21 through 28, 31, 32, 34, 39 through 45, and 51 through 53 within the meaning of 35 U.S.C. § 102(e).

II. *OBVIOUSNESS*

Under 35 U.S.C. § 103, the factual inquiry into obviousness requires a determination of: (1) the scope and content of the prior art; (2) the differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). "Section 103 forbids issuance of a patent when 'the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains.'" *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1734 (2007).

The Examiner's § 103 rejections in question are premised upon the Examiner's finding that Murthy teaches the claimed blanket deposition of a gaseous precursor mixture of a silicon source, a germanium source and an etchant (Ans. 6-8). However, as indicated *supra*, Murthy only teaches employing a gaseous precursor mixture of a silicon source, a germanium

source and an etchant for the purpose of carrying out selective deposition of a silicon germanium film. The Examiner has not identified any reason as to why one of ordinary skill in the art would have been led to employ such gaseous precursor mixture in the claimed blanket deposition method. *KSR Int'l*, 127 S.Ct at 1741, *quoting In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)("[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness"). Accordingly, we are constrained to agree with the Appellants that the Examiner has not established a prima facie case of obviousness of the subject matter defined by claims 5, 7, 8, 16 through 18, 29, 30, 33, 35 through 38, and 46 through 50 within the meaning of 35 U.S.C. § 103(a)

ORDER

The decision of the Examiner is reversed.

REVERSED

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